Appendix 3 – Net benefits per unit fishing effort for resident and roving anglers when roving anglers have higher travel costs than residents

Investing in the commons: transient welfare creates incentives despite open access

The net benefits of harvest per unit of fishing effort for an angler is:

$$NB_i = p_i q X - c_i \quad \text{Eq.A3.1}$$

Where *NB* = the net benefits of harvest per unit of effort from user group i, p = marginal willingness to pay for harvest for user group i, q = catchability coefficient, X = fish stock density, and c = marginal cost of fishing effort for user group i.

Substituting Equation A1.5 into Equation A3.1 demonstrates open-access "rent" dissipation at equilibrium because the marginal net benefits for each user group are equal to 0,

$$NB^*_{res} = p_{res} q X^* - c_{res} = p_{res} q \frac{c_{res}}{p_{res} q} - c_{res} = 0 \quad \text{Eq.A3.2}$$

$$NB^*_{rov} = p_{rov} q X^* - c_{rov} = \frac{c_{rov} p_{res}}{c_{res}} q \frac{c_{res}}{p_{res} q} - c_{rov} = 0 \quad \text{Eq.A3.3}$$

However, when the fish stock is not at equilibrium and is at density X, the marginal net benefits of resident anglers is less than roving anglers when $c_{res} < c_{rov}$:

$NB_{res} < NB_{rov}$,
$p_{res} q X - c_{res} < p_{rov} q X - c_{rov}$,
$p_{res} q X - c_{res} < \frac{c_{rov} p_{res}}{c_{res}} q X - c_{rov}$,
$p_{res} q X - c_{res} + c_{rov} < \frac{c_{rov}}{c_{res}} p_{res} q X$,
$1 - \frac{c_{res} + c_{rov}}{p_{res} q X} < \frac{c_{rov}}{c_{res}}$,
$c_{res} - \frac{2c_{res} + c_{res} c_{rov}}{p_{res} q X} < c_{rov}$,
$-\frac{2c_{re} + c_{res} c_{rov}}{p_{res} q X} < c_{rov} - c_{res}$,

is true given $c_{res} < c_{rov}$ (i.e. $c_{rov} - c_{res} > 1$) and $X \neq 0$.